

We claim:

1. A multi-cell battery, comprising:

a battery case; and

a plurality of electrochemical cells housed in said  
5 battery case, each of said cells including:

at least one positive electrode, at least one  
negative electrode and an electrolyte; and

an enclosure housing said at least one positive  
electrode, said at least one negative electrode and  
10 said electrolyte, said enclosure including a gas port  
allowing passage of cell gases into and out of said  
cell but preventing passage of said electrolyte out of  
said cell.

15 2. The battery of claim 1, wherein said gas port  
comprises a gas permeable material.

3. The battery of claim 1, wherein gas port comprises a  
hydrophobic material.

4. The battery of claim 1, wherein said electrolyte comprises an alkaline material.

5 5. The battery of claim 1, wherein said battery is a nickel-metal hydride battery.

6. The battery of claim 1, wherein said battery is a bipolar battery.

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7. A multi-cell battery, comprising:

a battery case; and

a plurality of electrochemical cells housed in said battery case, each of said cells including:

15 at least one positive electrode, at least one negative electrode and an electrolyte; and

an enclosure housing said at least one positive electrode, said at least one negative electrode and said electrolyte, said enclosure including a gas

permeable membrane allowing passage of cell gases into and out of said cell but preventing passage of said electrolyte out of said cell.

5 8. The battery of claim 7, wherein said gas permeable membrane comprises a polymeric material.

9. The battery of claim 7, wherein said polymeric membrane comprises a hydrophobic material.

10 10. The battery of claim 7, wherein said membrane comprises at least one layer of a membrane material.

11. The battery of claim 7, wherein said membrane protrudes outwardly from said cell.

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12. The battery of claim 7, wherein said membrane comprises at least one corrugated layer of a membrane material.

13. The battery of claim 7, wherein said plurality of cells are electrically coupled in series.

14. The battery of claim 7, wherein said at least one  
5 negative electrode comprises a hydrogen storage alloy.

15. The battery of claim 7, wherein said at least one positive electrode comprises a nickel hydroxide material.

10 16. The battery of claim 7, wherein electrolyte comprises an alkaline material.

17. The battery of claim 7, wherein said battery case is a common pressure vessel for each of said electrochemical  
15 cells.

18. The battery of claim 7, wherein battery operates at a peak pressure of at least 10 psi.

19. The battery of claim 7, wherein said enclosure is formed from an electrically nonconductive material.

20. The battery of claim 7, wherein said enclosure  
5 comprises a polymeric material.

21. The battery of claim 7, wherein each of said electrochemical cells is a bipolar cell.

10 22. A multi-cell battery, comprising:

a battery case; and

a plurality of electrochemical cells housed in said battery case, each of said cells including:

15 at least one positive electrode, at least one negative electrode and an electrolyte;

an enclosure housing said at least one positive electrode, said at least one negative electrode and said electrolyte, said enclosure having an opening

allowing passage of cell gases into and out of said cell; and

a hydrophobic material positioned relative to said opening so as to prevent passage of said electrolyte out of said cell.

23. The battery of claim 22, wherein said hydrophobic material is disposed along the periphery of said opening.

24. The battery of claim 22, wherein said hydrophobic material at least partially seals said opening.

25. The battery of claim 22, wherein said opening is a circuitous pathway formed by said hydrophobic material.

26. The battery of claim 22, wherein said hydrophobic material is gas permeable.

27. The battery of claim 22, wherein said hydrophobic material comprises at least one hydrophobic layer.

28. The battery of claim 22, wherein said plurality of  
5 cells are electrically coupled in series.

29. The battery of claim 22, wherein said at least one negative electrode comprises a hydrogen storage alloy.

10 30. The battery of claim 22, wherein said at least one positive electrode comprises a nickel hydroxide material.

31. The battery of claim 22, wherein said electrolyte comprises an alkaline material.

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32. The battery of claim 22, wherein said battery case is a common pressure vessel for each of said electrochemical cells.

33. The battery of claim 22, wherein said battery operates at a peak pressure of at least 10 psi.

34. The battery of claim 22, wherein said enclosure is  
5 formed from an electrically nonconductive material.

35. The battery of claim 22, wherein said enclosure comprises a polymeric material.

10 36. The battery of claim 22, wherein each of said electrochemical cells is a bipolar cell.

37. A bipolar electrochemical battery, comprising:

a battery case; and

15 a stack of at least two serially coupled electrochemical cells housed within said case, each of said cells comprising:

a positive electrode, a negative electrode, and  
an electrolyte; and



an enclosure housing said positive electrode,  
said negative electrode and said electrolyte, said  
enclosure including a gas permeable membrane allowing  
passage of cell gases into and out of said cell but  
5 preventing passage of said electrolyte out of said  
cell.

38. The battery of claim 37, wherein said membrane  
comprises a polymeric material.

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39. The battery of claim 37, wherein said membrane  
comprises a hydrophobic material.

40. The battery of claim 37, wherein said membrane  
15 comprises at least one layer of a membrane material.

41. The battery of claim 37, wherein said membrane  
protrudes outwardly from said cell.

42. The battery of claim 37, wherein said membrane comprises at least one corrugated layer of a membrane material.

5 43. The battery of claim 37, wherein said at least one negative electrode comprises a hydrogen storage alloy.

44. The battery of claim 37, wherein said at least one positive electrode comprises a nickel hydroxide material.

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45. The battery of claim 37, wherein said electrolyte comprises an alkaline material.

46. The battery of claim 37, wherein said battery case is  
15 a common pressure vessel for each of said electrochemical cells.

47. The battery of claim 37, wherein said battery operates at a peak pressure of at least 10 psi.

48. The battery of claim 37, wherein said enclosure comprises a first electrically conductive portion electrically coupled to said at least one positive  
5 electrode and a second electrically conductive portion electrically coupled to said at least one negative electrode, said first conductive portion electrically isolated from said second conductive portion.

10 49. The battery of claim 48, wherein said first conductive portion and said second conductive portion comprise a polymeric material.

50. The battery of claim 48, wherein said first and second  
15 conductive portions comprise a carbon-filled polymeric material.

51. The battery of claim 48, wherein adjacent cells have said first conductive portion of one cell contacting said  
20 second conductive portion of an adjacent cell.

52. The battery of claim 48, wherein said enclosure further includes an electrically nonconductive polymeric material sealed peripherally to said first and second  
5 conductive portions, said gas permeable membrane being at least a portion of said nonconductive material.

53. A bipolar electrochemical battery, comprising:

a battery case; and

10 a stack of at least two serially coupled electrochemical cells housed within said case, each of said cells comprising:

at least one positive electrode, at least one negative electrode, and an electrolyte; and

15 an enclosure housing said at least one positive electrode, said at least one negative electrode and said electrolyte, said enclosure having an opening allowing passage of cell gases into and out of said cell; and

a hydrophobic material positioned relative to said opening so as to prevent passage of said electrolyte out of said cell.

5 54. The battery of claim 1, wherein said hydrophobic material is disposed along the periphery of said opening.

55. The battery of claim 1, wherein said hydrophobic material at least partially seals said opening.

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56. The battery of claim 1, wherein said opening is a circuitous pathway formed by said hydrophobic material.

57. The battery of claim 1, wherein said hydrophobic  
15 material comprises at least one hydrophobic layer.

58. The battery of claim 1, wherein said at least one negative electrode comprises a hydrogen storage alloy.

59. The battery of claim 1, wherein said at least one positive electrode comprises a nickel hydroxide material.

60. The battery of claim 1, wherein said battery comprises  
5 an alkaline electrolyte.

61. The battery of claim 1, wherein said battery case is a common pressure vessel for each of said electrochemical cells.

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62. The battery of claim 1, wherein said battery operates at a peak pressure of at least 10 psi.

63. The battery of claim 1, wherein said enclosure  
15 comprises a first electrically conductive portion electrically coupled to said positive electrode and a second electrically conductive portion coupled to said negative electrode, said first conductive portion electrically isolated from said second conductive portion.

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64. The battery of claim 63, wherein said first conductive portion and said second conductive portion comprise a polymeric material.

5 65. The battery of claim 63, wherein said first conductive portion and said second conductive portion comprise a carbon-filled polymeric material.

66. The battery of claim 63, wherein adjacent cells have  
10 said first conductive portion of one cell contacting said second conductive portion of an adjacent cell.

67. The battery of claim 63, wherein said opening extends about the entire periphery of said first and second  
15 conductive portions.

68. The battery of claim 63, wherein said hydrophobic material is disposed along the periphery of said first and second conductive portions.

69. The battery of claim 63, wherein said enclosure further comprises a nonconductive polymeric portion sealed peripherally to said first and second conductive portions.